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(71) Applicant:
Olstykke Smede- og MaskinFabrik APS
2760 Malov (DK)

(72) Inventor:
Jensen, Christian Reenberg
2400 Kobenhavn NV (DK)
(74) Representative:
Roerboel, Leif et al
BUDDE, SCHOU & CO. A/S,
Vestergade 31
1456 Copenhagen K (DK)

(54) **Roller mat for conveying heavy articles**

(57) In a roller mat (1) comprising a number of inter-connected roller trays (3) with rollers (4) for supporting goods (not shown) being moved along the mat, the main novel feature is that the roller trays (3) are individually secured to a flexible base sheet (2) of rubber or rubber-like material.

With this arrangement, the roller mat (1) may be used to facilitate the movement of heavy articles on uneven surfaces.

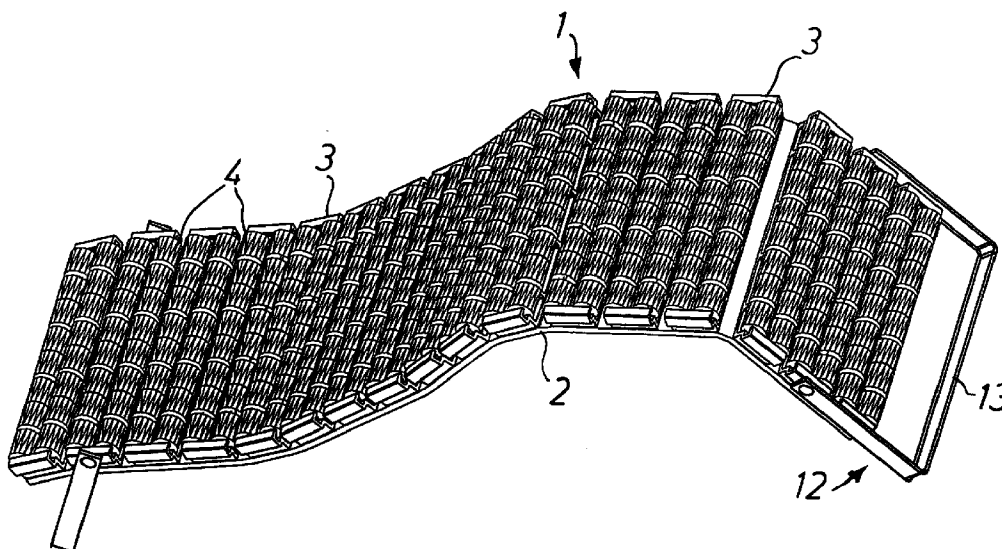


Fig. 1

EP 0 887 288 A1

DescriptionTECHNICAL FIELD

The present invention relates to a roller mat of the kind set forth in the preamble of claim 1.

BACKGROUND ART

US patent specification No. 5,390,775 discloses a roller mat of the kind referred to above, in which the individual roller trays, each having only a single roller, are releasably joined to each other to form a rigid mat of a substantially planar configuration. The roller mat disclosed in this publication is adapted to provide rolling movement of cargo units over the floor of a cargo deck. Such cargo decks are normally more or less plane, for which reason the rigidity of this previously known roller mat is not a serious drawback, but it is obviously unsuitable for use when heavy articles are to be moved on uneven surfaces. Thus, an attempt at using this previously known roller mat for supporting heavy articles on uneven surfaces entails the risk of damage to the mat, as it may be subjected to unduly high stresses in regions forming bridges between high points.

DISCLOSURE OF THE INVENTION

It is the object of the present invention to provide a roller mat of the kind referred to above, with which it is possible to facilitate the movement of heavy articles on uneven surfaces, and this object is achieved with a roller mat of said kind, according to the present invention also comprising the features set forth in the characterizing clause of claim 1. With this arrangement, the roller mat will adapt itself to the surface upon which it rests, so that the load from the articles being moved upon it will be transferred directly to the surface below the mat without any part of the latter having to act as a bridge.

Advantageous embodiments of the roller mat according to the present invention, the effects of which - beyond what is obvious - will be evident from the following detailed part of the present description, are set forth in claims 2-10.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed part of the present description, the invention will be explained in more detail with reference to the exemplary embodiment of a roller mat according to the invention shown in the drawings, in which

Figure 1 is a perspective view of a roller mat in a flexed condition,

Figure 2 is a perspective view of a roller tray that may be used as a component of the roller mat shown in Figure 1, and

Figure 3 is a side view showing the interconnected ends of two roller mats placed in continuation of each other.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The roller mat 1 shown in Figures 1 and 3 consists mainly of a flexible base sheet 2 of rubber or rubber-like material, on which is secured a number of roller trays 3, each in the embodiment shown comprising two sets of rollers 4. In the embodiment shown, the rollers 4 are freely rotatably supported on two shafts 5, cf. Figure 2, non-rotatably supported in the roller tray 3 by resting in recesses 6 formed in the top edges of supporting webs 7 protruding upwardly from a roller-tray base 8. The ends of the shafts are received in channels 9 formed in end pieces 10 likewise protruding upwardly from the base 8. The lower side of each channel 9 lies in a plane through the bottoms of the recesses 6, while the upper side is spaced from the lower side by a distance equal to the diameter of the shafts 5.

With the arrangement of the roller tray 3 shown in Figure 2, it is possible to use shafts 5 of a constant diameter (e.g. cut from stock) and assemble the roller tray 3 as follows:

- 1) insert the appropriate number of rollers 4 on a shaft 5 outside of the roller tray 3,
- 2) hold the shaft slanting and skewing slightly upwards and outwards from one end and insert that end into a channel 9,
- 3) swing the opposite end downwards and inwards while distributing the rollers 4 in the spaces between the end pieces 10 and the supporting webs 7 and the spaces between the latter, and
- 4) finally, force the free end of the shaft 5 into the channel 9 in the opposite end piece 10, until the shaft 5 clicks into the recesses 6 - this will, of course, entail temporary elastic bending of the base 8 and/or the shaft 5.

As will be evident, no bolts, nuts or other loose fasteners are needed.

Each roller tray 3 may be secured to the base sheet 2 in various ways, such as by using screws, rivets or wires in "stitches", but in the preferred embodiment the roller trays 3 are secured to the base sheet 2 by a vulcanizing process or a similar process creating a continuous bond between the lower surfaces of the roller-tray bases 8 and the upper surface of the base sheet 2.

To make it possible to flex the roller mat 1 in both directions, i.e. with the concave side above or below, the roller trays 3 are spaced in the manner shown in Figure 1, allowing the roller mat 1 to be flexed within limits with an upward concavity. The roller trays 3 will obviously not interfere with any flexing in the opposite direction.

The part of the roller trays 3 consisting of the base

8, the supporting webs 7 and the end pieces 10 is preferably manufactured by extruding a suitable metal, such as aluminum or an aluminium alloy, through a suitable die, after which the extruded material is cut into pieces of the correct size, the final step being the forming of the recesses 6, such as by milling with a rotary cutter.

The shafts 5 are preferably made from stainless steel or other non-corroding metal of high strength, while the rollers 4 are preferably made from polyamide ("nylon").

As will be evident from Figure 2, the width W of the base 8 is substantially greater than the distance S between the axes 11 of the shafts 5 (only one of which is visible in this Figure). This provides for stability in the rolling directions (transversely to the length direction of the roller tray 3), because "toppling" is prevented, partly by the wide supporting base providing gravitational stability, partly by the large area of adhesion between the roller-tray base 8 and the base sheet 2.

In many cases, one roller mat 1 is not sufficient to cover the length of the path, through which goods (boxes or luggage) are to be conveyed. For this reason, the roller mat is equipped with a coupling brace 12 comprising a coupling rod 13 capable of being placed between two roller trays on an adjoining roller mat placed in continuation of the roller mat 1 as shown in Figure 3, thus preventing the two mats from coming apart when subjected to loads. Other coupling means, such as hooks cooperating with studs, may also be used, and the coupling means may also be used for connecting the roller mat 1 to e.g. a conveyor, a chute or some other structural part.

In the embodiment shown, the roller mat 1 is straight as viewed at right angles to the shafts 5, for which reason it can only be used for moving goods in substantially straight-line motion, at least as viewed from above. In a further embodiment, that is not shown in the drawing but can readily be imagined and constructed by a skilled person, the roller mat is curved in its own plane, making it possible to convey goods along a curved path. In this embodiment, the roller trays can be angularly distributed to match the curvature of the path, and if the distance between the roller trays in the "outer lanes" is too great for smooth operation, short auxiliary roller trays may be placed to bridge the spaces concerned, naturally with the rollers at a suitable intermediate angle.

To reduce the risk of edge fissures spreading through the base sheet 2, the latter may be reinforced in a suitable manner, such as having a flexible metal wire mesh embedded in it.

It should be noted that - due to the resiliency of the roller-tray bases 8 and/or of the shafts 5, as well as the flexibility of the base sheet 2 - the shafts 5 with the rollers 4 may be removed singly by first flexing the base sheet 2 along the nearest edge of the roller tray 3 concerned to increase the space between the roller trays, vide the space between the third and the fourth roller

tray from the right in Figure 1, and then carrying out the steps 1-4 described above in the opposite sense and order, after which a replacement shaft or the same shaft with one or more replacement rollers may be placed in position by carrying out said steps 1-4 in the normal order, finally flexing the base sheet 2 back to its previous shape - bent or straight.

As is also the case with certain previously known roller mats and roller trays, both the roller mat 1 and the roller tray 3 as described above may be placed upside-down and used as a cart or trolley for moving heavy goods or furniture. The roller tray 3 may, of course, also be used singly with the rollers facing upwardly to facilitate movement of heavy goods or furniture or long objects, such as beams, e.g. across a threshold, or else in a small number distributed on a floor or other surface for successively supporting such articles, the trays having been passed being moved up in front.

LIST OF PARTS

1	roller mat
2	base sheet
3	roller tray
4	roller
5	shaft
6	recess
7	supporting web
8	roller-tray base
9	channel
10	end piece
11	axis
12	coupling brace
13	coupling rod
S	distance
W	width

Claims

1. Roller mat (1) of the kind comprising a number of interconnected roller trays (3) each having at least one rotatably supported roller (4) adapted to support articles being conveyed on said roller mat, characterized in that said roller trays (3) are separately and independently secured to a common base sheet (2) of flexible material, said roller trays (3) being spaced so as to allow flexing of said common base sheet (2) to an upwardly concave shape.
2. Roller mat (1) according to claim 1, characterized by at least at one end having a coupling member (12,13) adapted to connect the mat to another, similar roller mat, with a conveyor or with some other structural part.
3. Roller mat (1) according to claim 1 or 2, characterized in that each roller tray (3) comprises at least two sets of rollers (4), the rollers of each set being

spaced in the conveying direction from the rollers in the other set or sets, the base (8) of each roller tray (3) having a width (W) in the conveying direction substantially greater than the distance (S) between the axes (11) of said sets of rollers (4).

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4. Roller mat (1) according to claim 3, characterized in that the height of said axes (11) above the upper side of said roller-tray base (8) is not greater than necessary for creating a sufficient operating clearance between said rollers (4) and said base (8). 10
5. Roller mat (1) according to any one or any of the claims 1-4, characterized in that said common base sheet (2) consists mainly of rubber or rubber-like material. 15
6. Roller mat (1) according to any one or any of the claims 1-5, characterized in that said common base sheet (2) is reinforced by a flexible mesh embedded therein. 20
7. Roller mat according to any one or any of the claims 1-6, characterized in that it is curved in its own main plane. 25
8. Roller mat according to claim 7, characterized in that the roller trays extend at mutual angles corresponding to the curvature of the roller mat. 30
9. Roller mat according to claim 8, characterized in that short auxiliary roller trays are placed between the diverging ends of said roller trays and bisecting said angles. 35
10. Roller mat according to any one or any of the claims 1-9, characterized in that said roller trays are secured to said common base sheet by vulcanizing the lower faces of the roller-tray bases to the upper face of the common base sheet. 40

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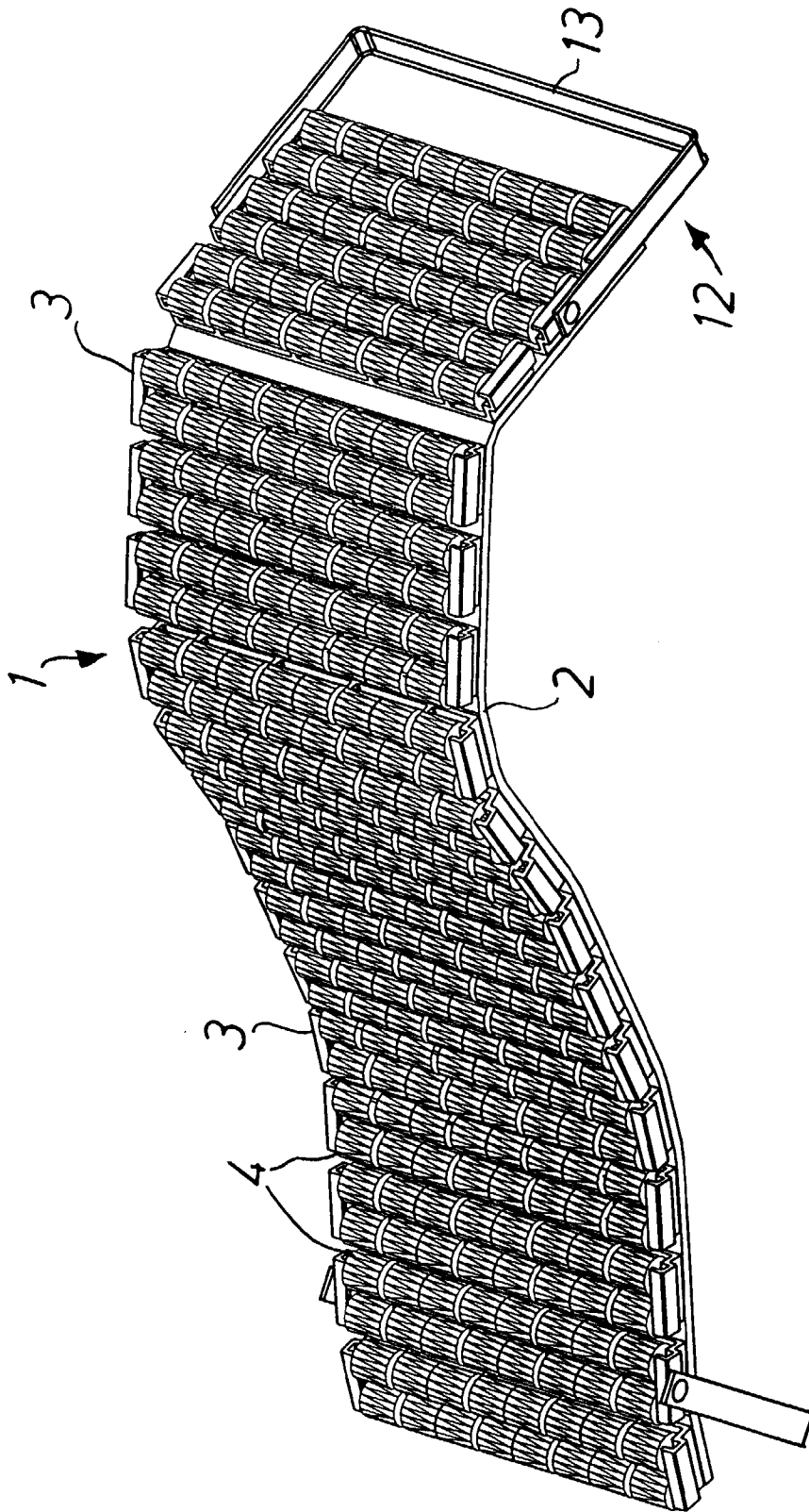
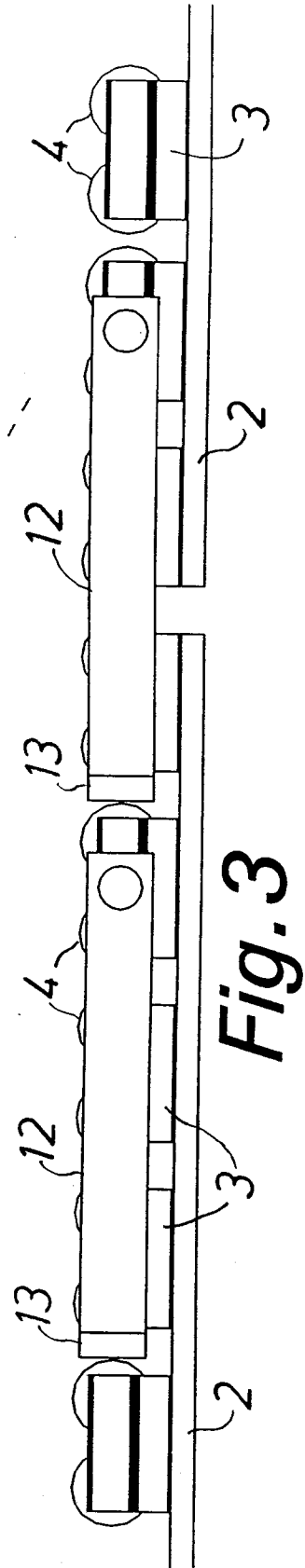
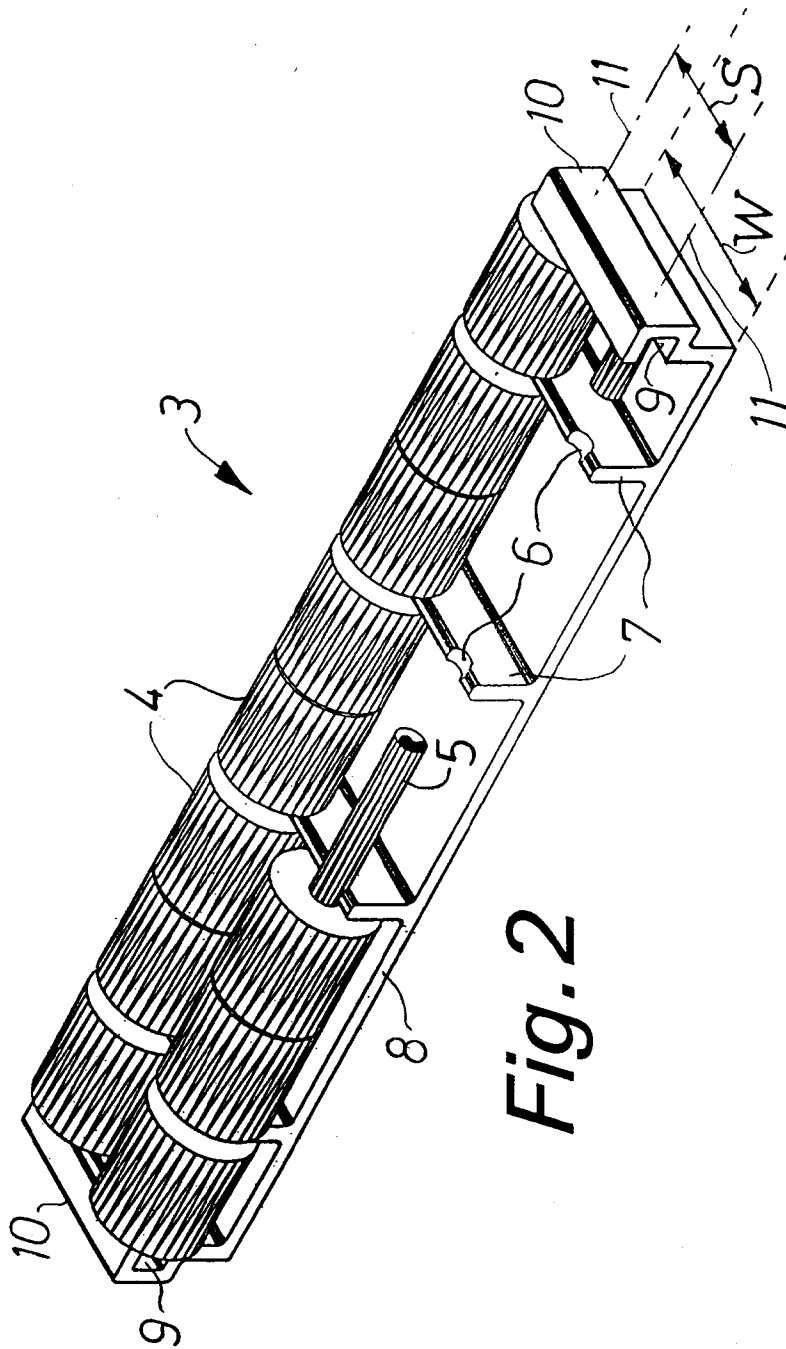


Fig. 1





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EUROPEAN SEARCH REPORT

Application Number
EP 97 11 0216

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	AU 45439 68 A (IPEC AUSTRALIA LIMITED) * the whole document *	1,5	B65G13/11 B65G13/00 B65G39/12 B65G13/12
X	US 2 920 734 A (HEINRICH) * the whole document *	1	
X	FR 2 302 259 A (MITSUI & CO EUROP SA) * the whole document *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 613 (M-1709), 22 November 1994 & JP 06 234406 A (MISAWA HOMES CO LTD), 23 August 1994, * abstract *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65G
Place of search	Date of completion of the search	Examiner	
THE HAGUE	7 November 1997	Ostyn, T	
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